No. XV.

CONDENSED BRASS.

The Thanks of the Society were voted to Mr. CORNELIUS VARLEY, *for the following Communication respecting a method of condensing Brass, invented by the late Mr. S.* VARLEY.

Holywell Street, Westminster,
October 16, 1828.

SIR,

ABOUT thirty-five years ago, a very costly chronometer was put into the hands of my late uncle, Mr. Samuel Varley. It was apparently without fault, but had baffled the efforts of some of the best workmen in the trade to make it keep time. My uncle discovered the cause of this imperfection to arise from the balance being magnetic; he accordingly replaced it by one of well-hammered gold, and the watch was soon made to keep good time. He was ever afterwards accustomed to employ gold or brass as the material for the balances of all important watches, making the brass himself in order to secure its purity, and hammering both it and the gold in the tool about to be described. He also made escapement-wheels of brass thus hammered, and was frequently applied to by others in the trade for brass of his making and preparing, it being found that such would bear cutting finer and sharper than any other, without failing; for (to use the somewhat quaint but expressive phrase of the workmen), his brass exhibited in the lathe a certain sweetness and pleasantness, evidently the result of superior homogeneity.

If a piece of malleable metal be successively struck on two opposite sides by a hammer the face of which is larger than the metal, this latter soon spreads out and cracks at the edges. If, on the contrary, the face of the metal is larger than that of the hammer, and the blows be given, as nearly as may be, on the centre of the plate, the part struck, being surrounded by a hoop of metal, as it were, can scarcely spread laterally, and is soon hardened by condensation: but the neighbouring parts, in proportion as they approach the margin of the plate, not being sufficiently restrained from spreading under the hammer, cannot be hardened in the same degree with the middle portion: besides, every blow, while hardening the part immediately under it, is, in consequence of the inequality of resistance, producing a contrary action on the adjacent parts, by violently straining and stretching them. If the metal be in the form of a block, and be hammered on all sides, a tolerably uniform mass may be obtained; but this uniformity is only a balance of opposite states all through the mass, it being impossible to condense the block by hammering in one part, without forcibly straining the neighbouring parts. Such hammering, therefore, is limited; for although a certain quantity hardens the metal, every blow beyond this increases its unsoundness, till at last the block is good for nothing, and can only be cured by melting or welding it afresh.

The tool figured Plate XIII. obviates all these inconveniences. *u u*, fig. 17, is the section of a block of hard steel, made perfectly flat at bottom, where it rests on the face of the anvil *v v;* a hole, about 1-4th of the diameter of the block, is bored through its axis truly vertical; *w* is a short cylinder of hard steel dropped into the hole in the block, which it accurately fits, and resting on the anvil;

x is the piece of brass or other metal to be hardened: it must be turned quite clean and smooth, so as to fit the hole with perfect accuracy, and must be made quite flat both at top and at bottom; y is a punch of hard steel, with a somewhat convex top. The pieces being put together, as represented in fig. 17, the top of the punch y is to be struck with a moderately heavy hammer, gently at first, and increasing gradually to the utmost effect; this must then be changed for the largest hammer that the block and punches can safely bear. The momentum of the blows will be communicated to the disk x; and as both this and the punches are made accurately to fit the hole in the block, it is evident that the only effect of the blows can be the condensation of the disk x. At the commencement of the hammering, a remarkable difference, both in sound and in the feel of the hammer in the hand, will be perceived between striking on the punch and on the anvil: as the work proceeds, this difference becomes less; and when the difference has ceased, that is, when the hammer rebounds from the top of the punch as much as it would do from the anvil, the metal has acquired its greatest degree of hardening by compression. A large hammer, with moderate speed, appears to communicate its effect deeper into a block of metal than a lighter one moving as much quicker as it is lighter; for the metal springs to a quick blow, for want of time to allow the particles permanently to recede; a heavy blow, on the contrary, being slower than the vibrations of the metal, overrules them, and sends the effect deeper into its substance. The shorter the punch, the more efficiently does it communicate the impulse of the hammer: the length, therefore, of the hole in the block above the metal should not be more than sufficient to form a secure guide to the

punch, and the upper unsupported part of the punch should be as short as it can conveniently be made. The block, as well as the upper and the lower punch, should be hardened and then tempered to a straw colour, to enable them to bear the long-continued action of the hammer.

The disk of metal is got out by withdrawing the upper punch, and then placing the block over a hole larger than its own; a long punch being then put in, a few blows of the hammer will force out the short punch and the condensed metal.

C. VARLEY.

A. AIKIN, Esq.
Secretary, &c. &c.

No. XVI.

IMPROVED FRENCH WINDOW.

The SILVER ISIS MEDAL and FIVE POUNDS were presented to Mr. R. PARVIN, 3, Carpenter Street, Mount Street, Berkeley Square, for his improved French Window; a Model of which has been placed in the Society's Repository.

THOSE windows which open by folding leaves instead of by sashes are commonly called French windows. The objection to their use in a damp and cold climate is the difficulty of making the leaves fit so closely as to exclude the wet and the wind. Endeavours have been made (and